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10/571,288	03/09/2006	Wolfgang Heeb	016906-0473	8171

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EXAMINER	
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1793	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	**Application No.** 10/571,288	**Applicant(s)** HEEB ET AL.	
	Examiner Nicholas P. D'Aniello	**Art Unit** 1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _08 March 2010_.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-7 and 9-30_ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1-7 and 9-30_ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _3-1-2010_.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

The rejections have been maintained; see the response to arguments section for clarification. All the references are of record and no PTO-892 is attached.

Claim Rejections - 35 USC § 103

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

2. Claims 1, 2, 4, 5, 6, 9, 10, 16-19 and 22-30 are rejected under 35 U.S.C. 103(a) as obvious over Werner (US Patent No. 3,844,777 of record) in view of Mandigo et al. (USP 3,966,506 of record, hereinafter Mandingo)

As to **claim 1**, Werner teaches a brazing workpiece (taken to be a soldering workpiece as the melting temperature of the filler alloy may be as low as 424ºC, see claim 1 of Werner) comprising: a solder workpiece made from aluminum (column 1 lines 8-9) and an aluminum containing brazing (soldering) filler alloy (column 1 lines 52-59) which is directly applied to the workably thin oxide film (column 2 lines 24-34).

Werner acknowledges the presence of an oxide film on the aluminum workpiece however does not disclose the thickness is greater than 25 nm. However, Mandigo teach a process of preparing an aluminum work pieces for brazing operations and the desirability to cold work and partially anneal the aluminum at a temperature of 500-700ºF which prevents deleterious grain coarsening during the subsequent brazing operation (see at least column 2).

It would have been obvious to one of ordinary skill in the art at the time of the invention to cold work and partially anneal the soldering workpiece of Werner prior to brazing in order to prevent grain coarsening during brazing as taught by Mandigo, the partial annealing of the aluminum alloy inherently creates a brazing workpiece with an oxide thickness greater than 25 nm.

Please note - as applicant discloses in the instant specification (last paragraph of page 3) it is inherent that native oxide films on aluminum induced from ambient air are less than 20nm thick. Therefore the annealed work piece in the combination above (used in the process of Werner) inherently has a thicker oxide than a native aluminum oxide layer formed in ambient air.

Regarding **claims 2, 16 and 17**, although no oxide thicknesses are disclosed by the references, partially annealing at 500ºF (260ºC) is taken to create an oxide thickness within claimed range absent any evidence to the contrary as thicker oxide layers inherently form on aluminum at elevated temperatures.

Regarding **claims 4 and 18**, Werner discloses that the oxide layer is penetrated by the filler alloy allowing contact with the base metal therefore the oxide layer is not continuous and must comprise inhomogeneities such as cracks (column 2, lines 30-34).

Regarding **claim 5**, this claim relates to a product by process limitation which does not limit the scope of this claim (see MPEP 2113), in any event, Werner discloses that the oxide layer is *chemically* treated to make it workably thin (column 2 line 28).

Regarding **claim 6**, Werner discloses cleaning with a water based solution containing HF (column 2 lines 40-42), which is reasonably considered a fluorine (halogen) containing lubricant.

In regard to **claims 9 and 19**, Werner teaches the aluminum may be 6061 which contains magnesium in the amount between 0.8 and 1.2 wt% (see TABLE).

In regard to **independent claim 10**, Werner teaches a process of joining two work pieces, at least one as described in claim 1, joining the work pieces by a brazing process, due to the low melting temperature of the brazing filler alloy of the brazing method this is reasonably considered a soldering process.

Regarding **independent claim 22**, Werner discloses a brazing (soldering) process for joining at least two work pieces to one another comprising:

a. providing a soldering workpiece made from aluminum and/or aluminum compounds (column 1 lines 8-9) which inherently has an oxide layer present

b. the surfaces are prepared by introducing inhomogeneities into the oxide surface by a chemical cleaning process (column 2, lines 20-34), and

c. The parts are then soldered together in a vacuum atmosphere and allowed to cool in an inert atmosphere. (column 2, lines 35-61).

The process of Werner is reasonably considered a soldering process in view of applicant's definition of soldering (page 4, last paragraph of instant specification) which defines standard soldering for aluminum as a joining process with temperatures between 500 and 660ºC; where the soldering alloys (referred to as braze alloys in Werner) have a melting temperature between 424 and 615 ºC (see claim 1 of Werner)

the process of Werner is consequently considered a soldering process. The cleaning process of Werner creates inhomogeneities in the oxide layer which allows for a capillary effect (drawn in due to the surface tension of cracks and holes) of the soldering alloy into the oxide film (column 1, lines 19-25).

Independent claim 22 differs from the reference in calling for the oxide layer to be up to 20nm thick and then increasing the thickness of the oxide. However, Mandigo teach a process of preparing an aluminum work pieces for brazing operations and the desirability to cold work and partially anneal the aluminum at a temperature of 500-700ºF which prevents deleterious grain coarsening during the subsequent brazing operation (see at least column 2). Although not specifically disclosed, prior to being annealed the aluminum workpiece of Mandigo would inherently have an oxide thickness of less than 20 nm as such is inherent to all aluminum and aluminum alloy work pieces exposed to ambient air as disclosed by applicant (page 3, last paragraph of instant specification).

It would have been obvious to one of ordinary skill in the art at the time of the invention to cold work and partially anneal the soldering workpiece of Werner prior to brazing in order to prevent grain coarsening during brazing as taught by Mandigo, the partial annealing of the aluminum alloy inherently creates a brazing workpiece with an oxide thickness greater than 25 nm.

Please note - as applicant discloses in the instant specification (last paragraph of page 3) it is inherent that native oxide films on aluminum induced from ambient air are less than 20nm thick. Therefore the annealed work piece in the combination above

(used in the process of Werner) inherently has a thicker oxide than a native aluminum oxide layer formed in ambient air.

In regard to **claims 23 and 27**, although no oxide thicknesses are disclosed by the references, partially annealing at 500ºF (260ºC) is taken to create an oxide thickness within claimed range absent any evidence to the contrary as thicker oxide layers inherently form on aluminum at elevated temperatures.

In regard to **claim 24**, although Werner does not specifically teach the oxide film detaching from the workpiece, however the workpiece and process of Werner are structurally and methodically indistinguishable from the claimed method and therefore it is reasonably assumed that at least part of the oxide film will fragment and detach from the workpiece during the soldering step.

In regard to **claim 25**, Werner teaches the surfaces are chemically cleaned with a solution of water and hydrofluoric acid (a halogen containing lubricant) to provide a workably thin oxide layer which the filler alloy may penetrate (column 2 lines 39-42) the oxide layer is penetrated by the filler alloy allowing contact with the base metal therefore the oxide layer is not continuous and must comprise inhomogeneities such as cracks.

Regarding **claim 28**, Werner discloses that the oxide layer is penetrated by the filler alloy allowing contact with the base metal therefore the oxide layer is not continuous and must comprise inhomogeneities such as cracks (column 2, lines 30-34).

Regarding **independent claim 26**, Werner discloses the soldering workpiece of claim 1 which is aluminum with an aluminum oxide layer to which a filler is directly applied where the oxide is a sufficient thickness to provide contact between the brazing

(soldering) compound and the workpiece underneath the oxide by allowing penetration of the filler alloy (column 2 lines 30-34), therefore the oxide film is not continuous and must have inhomogeneities such as cracks.

Werner acknowledges the presence of an oxide film on the aluminum workpiece however does not disclose the thickness is greater than 25 nm. However, Mandigo teach a process of preparing an aluminum work pieces for brazing operations and the desirability to cold work and partially anneal the aluminum at a temperature of 500-700ºF which prevents deleterious grain coarsening during the subsequent brazing operation (see at least column 2).

It would have been obvious to one of ordinary skill in the art at the time of the invention to cold work and partially anneal the soldering workpiece of Werner prior to brazing in order to prevent grain coarsening during brazing as taught by Mandigo, the partial annealing of the aluminum alloy inherently creates a brazing workpiece with an oxide thickness greater than 25 nm.

Please note - as applicant discloses in the instant specification (last paragraph of page 3) it is inherent that native oxide films on aluminum induced from ambient air are less than 20nm thick. Therefore the annealed work piece in the combination above (used in the process of Werner) inherently has a thicker oxide than a native aluminum oxide layer formed in ambient air.

Regarding **claim 29**, as noted above, although no oxide thicknesses are disclosed by the references, partially annealing at 500ºF (260ºC) is taken to create an

oxide thickness within claimed range absent any evidence to the contrary as thicker oxide layers inherently form on aluminum at elevated temperatures.

Regarding **claim 30**, Mandigo teach that the aluminum sheet has been annealed at 500 ºF (260ºC) which includes heating the aluminum workpiece to the claimed range as the workpiece temperature will inherently pass through the claimed range as it is heated from an ambient temperature.

3. Claims 1, 2, 4, 5, 6, 9, 10, 16-19 and 22-30 are rejected under 35 U.S.C. 103(a) as obvious over Werner (US Patent No. 3,844,777 of record) in view of Toh et al. ("An investigation of the native oxide of aluminum alloy 7475-T7651 using XPS, AES, TEM, EELS, GDOES and RBS", of record).

As to **claim 1**, Werner teaches a brazing workpiece (taken to be a soldering workpiece as the melting temperature of the filler alloy may be as low as 424ºC, see claim 1 of Werner) comprising: a solder workpiece made from aluminum (column 1 lines 8-9) and an aluminum containing brazing (soldering) filler alloy (column 1 lines 52-59) which is directly applied to the workably thin oxide film (column 2 lines 24-34).

Werner acknowledges the presence of an oxide film on the aluminum workpiece however does not disclose the thickness is greater than 25 nm. However, Toh et al. teaches a similar aluminum alloy which has high strength and superior toughness (see page 366 - 2.1. *The alloy sample*) which has been heat treated and has an oxide thickness between 100 and 500 nm (see page 370 - Discussion and Conclusions).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the aluminum alloy of Toh et al. for the soldering workpiece of Werner in order to create a workpiece with superior properties as taught by Toh et al., such an alloy inherently has an oxide thickness greater than 25 nm.

Please note - as applicant discloses in the instant specification (last paragraph of page 3) it is inherent that native oxide films on aluminum induced from ambient air are less than 20nm thick. Therefore the workpiece of Toh et al. used in the process of Werner, which has been hot rolled and has a much thicker oxide, will inherently have an oxide film of at least 25 nm thick which is thicker than the aluminum oxide layer formed in ambient air.

Regarding **claims 2, 16 and 17**, as noted above, the alloy of Toh et al. naturally forms an oxide layer which is between 100 - 500 nm.

Regarding **claims 4 and 18**, Werner discloses that the oxide layer is penetrated by the filler alloy allowing contact with the base metal therefore the oxide layer is not continuous and must comprise inhomogeneities such as cracks (column 2, lines 30-34).

Regarding **claim 5**, this claim relates to a product by process limitation which does not limit the scope of this claim (see MPEP 2113), in any event, Werner discloses that the oxide layer is *chemically* treated to make it workably thin (column 2 line 28).

Regarding **claim 6**, Werner discloses cleaning with a water based solution containing HF (column 2 lines 40-42), which is reasonably considered a fluorine (halogen) containing lubricant.

In regard to **claims 9 and 19**, Werner teaches the aluminum may be 6061 which contains magnesium in the amount between 0.8 and 1.2 wt% (see TABLE). Toh et al. teach aluminum alloy 7475 which may have 1.9wt% magnesium.

In regard to **independent claim 10**, Werner teaches a process of joining two work pieces, at least one as described in claim 1, joining the work pieces by a brazing process, due to the low melting temperature of the brazing filler alloy of the brazing method this is reasonably considered a soldering process.

Regarding **independent claim 22**, Werner discloses a brazing (soldering) process for joining at least two work pieces to one another comprising:

d. providing a soldering workpiece made from aluminum and/or aluminum compounds (column 1 lines 8-9) which inherently has an oxide layer present

e. the surfaces are prepared by introducing inhomogeneities into the oxide surface by a chemical cleaning process (column 2, lines 20-34), and

f. The parts are then soldered together in a vacuum atmosphere and allowed to cool in an inert atmosphere. (column 2, lines 35-61).

The process of Werner is reasonably considered a soldering process in view of applicant's definition of soldering (page 4, last paragraph of instant specification) which defines standard soldering for aluminum as a joining process with temperatures between 500 and 660ºC; where the soldering alloys (referred to as braze alloys in Werner) have a melting temperature between 424 and 615 ºC (see claim 1 of Werner) the process of Werner is consequently considered a soldering process. The cleaning process of Werner creates inhomogeneities in the oxide layer which allows for a

capillary effect (drawn in due to the surface tension of cracks and holes) of the soldering alloy into the oxide film (column 1, lines 19-25).

Independent claim 22 differs from the reference in calling for the oxide layer to be up to 20nm thick and then increasing the thickness of the oxide. However, Toh et al. teach an aluminum work piece with a similar composition that has high strength and superior toughness (page 366 - 2.1 *The alloy sample*) which is hot rolled, increasing its oxide to a thickness of 100-500 nm (see page 370 - Discussion and Conclusions).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the hot rolled aluminum workpiece of Toh et al. in the process of Werner because the aluminum workpiece of Toh et al. has superior mechanical properties. Although not specifically disclosed, at some point prior to being hot rolled the aluminum workpiece of Toh et al. would inherently have an oxide thickness of less than 20 nm as such is inherent to all aluminum and aluminum alloy work pieces as disclosed by applicant (page 3, last paragraph of instant specification).

In regard to **claims 23 and 27**, Toh et al. teach that the hot rolling forms an oxide with a thickness (100-500nm) that substantially overlaps the ranges in these claims.

In regard to **claim 24**, although Werner does not specifically teach the oxide film detaching from the workpiece, however the workpiece and process of Werner are structurally and methodically indistinguishable from the claimed method and therefore it is reasonably assumed that at least part of the oxide film will fragment and detach from the workpiece during the soldering step.

In regard to **claim 25**, Werner teaches the surfaces are chemically cleaned with a solution of water and hydrofluoric acid (a halogen containing lubricant) to provide a workably thin oxide layer which the filler alloy may penetrate (column 2 lines 39-42) the oxide layer is penetrated by the filler alloy allowing contact with the base metal therefore the oxide layer is not continuous and must comprise inhomogeneities such as cracks.

Regarding **claim 28**, Werner discloses that the oxide layer is penetrated by the filler alloy allowing contact with the base metal therefore the oxide layer is not continuous and must comprise inhomogeneities such as cracks (column 2, lines 30-34).

Regarding **independent claim 26**, Werner discloses the soldering workpiece of claim 1 which is aluminum with an aluminum oxide layer to which a filler is directly applied where the oxide is a sufficient thickness to provide contact between the brazing (soldering) compound and the workpiece underneath the oxide by allowing penetration of the filler alloy (column 2 lines 30-34), therefore the oxide film is not continuous and must have inhomogeneities such as cracks.

Werner acknowledges the presence of an oxide film on the aluminum workpiece however does not disclose the thickness is greater than 25nm. However, Toh et al. teaches a similar aluminum alloy which has high strength and superior toughness (see page 366 - 2.1.*The alloy sample*) which has been hot rolled and has an oxide thickness between 100 and 500 nm (see page 370 - Discussion and Conclusions).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the aluminum alloy of Toh et al. for the soldering workpiece of Werner

in order to create a workpiece with superior properties as taught by Toh et al., this hot rolled workpiece inherently has an oxide thicker than that formed in ambient air.

Please note - as applicant discloses in the instant specification (last paragraph of page 3) it is inherent that native oxide films on aluminum induced from ambient air are less than 20nm thick. Therefore the workpiece of Werner, as modified by Toh et al., which has been hot rolled, will inherently have an oxide film of at least 25 nm thick which is thicker than the aluminum oxide layer formed in ambient air.

Regarding **claim 29**, as noted above, Toh et al. teaches the aluminum alloy inherently has an oxide layer which substantially overlaps the claimed range.

Regarding **claim 30**, Toh et al. teach that the aluminum sheet has been hot rolled which, by definition, means the sheet has been heated above its re-crystallization temperature which inherently includes heating to, and above (which is not excluded from the claim), the claimed range.

4. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Werner and Toh et al. or Werner and Mandigo as applied to claim 1 above, and further in view of McMillan et al. (US Patent No. 3,986,897, of record).

Werner teaches a soldering work piece with solder directly applied to an oxide layer as applied to claim 1 above. **Claim 3** differs from the reference in calling for the oxide/hydroxide layer to be predominantly boehmite. However, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the aluminum oxide layer in a hydrated boehmite form because McMillan et al. discloses the

treatment of aluminum by converting aluminum oxide to boehmite in order to achieve an aluminum substrate with a smoother less hillocked surface which also avoids pitting, electro-migration and has improved thermal properties (column 1, lines 43-50 and column 2, lines 52-62).

5. Claims 7, 11, 12, 13, 15 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Werner and Toh et al. or Werner and Mandigo as applied to claim 1 or 10 above, and further in view of Swaney (US Patent No. 3,747,199, of record).

Werner teaches a soldering work piece with an oxide layer thicker then the native oxide layer as applied to claim 1. **Claim 7** differs from the reference in calling for a particular lubricant. However, it would have been obvious in the art to provide the soldering work piece with a lubricant containing sulfur because Swaney teaches a method of brazing (soldering) aluminum articles which have been provided with a petroleum based lubricant, Cindol 3401, which contains bromine (halogen) and sulfur compounds which provides for successful brazing of the components (column 2, lines 23-27).

In regard to **claims 11, 12 and 20**, Swaney teaches a method of successfully vacuum brazing aluminum articles as applied above where the workpiece has been cold worked by a pressing (punching) operation (column 1, lines 36-48). It would have been obvious to one of ordinary skill in the art at the time of the invention to machine the workpiece to the desired dimensions and use a halogen and sulfur compound

containing lubricant in the method of Werner to successfully form a brazed article as taught by Swaney.

In regard to **claim 13**, it would have been obvious in the art that the thermal degreasing and soldering would be carried out together because Swaney teaches a single heating operation where the lubricants are volatilized (evaporated, thermal degreasing) and then the temperature is increased to effectuate the braze (column 2, lines 28-47).

In regard to **claim 15**, Swaney teaches an example of his invention is for the fabrication of a typical aluminum brazed heat exchanger (column 1, lines 36-44).

6. Claims 14 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Werner and Toh et al. or Werner and Mandigo as applied to claim 10 above, and further in view of Knepper et al. (USP 5,618,357)

In regard to **claims 14 and 21**, Werner discloses the aluminum joining method of claim 10 where the heating is carried out in a vacuum (column 2 line 50). Claims 14 and 21 differ from the reference in calling for the heating to be carried out in an inert gas atmosphere such as argon. However, Knepper et al. teaches the joining of aluminum components by a soldering process which can take place in an inert/protective gas atmosphere or in a vacuum (column 1 lines 35-40) where an inert/protective gas such as argon is used (column 3, lines 34-37).

It would have been obvious to one of ordinary skill in the art at the time of the invention to employ a shielding gas such as argon in the process of Werner because

inert (shielding) gasses and vacuum processing are art recognized alternatives for aluminum joining as exemplified by Knepper et al.

Response to Arguments

Applicant's arguments have been fully considered but they are not persuasive. Specifically, in regard to the combination of Werner and Mandingo - applicant argues that incorporating the pre-brazing cold rolling and annealing treatment of Mandigo would teach away from the Werner reference because Werner wants a thin oxide layer during the brazing process. However, this is not persuasive because the combination proposed above incorporates the annealing process prior to the cleaning (i.e. making the oxide workably thin) and joining operation and does not increase the oxide layer of the workpiece after or during the cleaning and brazing operation (which would be undesirable in the process of Werner). One of ordinary skill in the art would have appreciated that the joining process of Werner would be applicable to a workpiece that had been previously annealed. In fact, Mandigo particularly discloses that the process is specifically designed for an aluminum workpiece prior to brazing (abstract).

Similiarly, in regard to the combination of Werner and Toh et al. - applicant argues that using a hot rolled workpiece would not be suitable for the process of Werner. However, one of ordinary skill in the art reading Werner as a whole would have appreciated that Werner is not only drawn to aluminum work pieces with a native oxide. Werner is clear that prior to the brazing process the workpiece has been cleaned to reduce the oxide thickness and allow penetration to the base alloy but no where does

the reference preclude using a workpiece that has been subjected to an oxidizing process such as hot rolling or the like. Applicant is attempting to limit the Werner reference to only aluminum work pieces which have a native oxide which the reference is clearly not limited to.

Applicant argues that the thick scale produced by the highly oxidizing condition of hot rolling would not be a native oxide and the Examiner agrees; however, nowhere in the rejection or previous response to arguments has the hot rolled oxide been equated to a native oxide.

The argument that one of ordinary skill in the art would have understood that such a hot rolled workpiece would not be suitable for brazing is not commensurate with the combination in the rejection because the hot rolled workpiece will be chemically treated by the process of Werner to create a “workably thin" oxide prior to brazing. One of ordinary skill in the art would have understood that a hot rolled workpiece would not be suitable for brazing without the addition of a process to remove the thick oxide.

Applicant argues that the workpiece disclosed by Toh has different alloying elements than the disclosed example in Werner. However, this connection was only made to show that similar aluminum alloys are used <u>as examples</u> in both of the references. Werner is not limited to these examples and is open to any aluminum alloy (column 1 lines 59-61). One of ordinary skill in the art would have appreciated that these alloys are very similar and both are used in applications that require brazing and hot rolling to fabricate structures with the desired properties.

To reiterate a previous argument, the oxide being thicker than a native oxide is an inherent property of the thicker hot rolled oxide film disclosed by Toh et al. or the oxide of the annealed aluminum work piece taught by Mandigo. Although Werner teaches the oxide film has to be “workably thin” an oxide film on the order of **nanometers** is well within the range of the normal meaning of **thin** and within the scope of Werner's disclosure. Applicant has not provided evidence that a thickness of greater than 25nm would not be considered “workably thin” in Werner et al.

To state simply, it would have been obvious to take the hot rolled aluminum work pieces of Toh et al. (which have excellent mechanical properties) or the annealed work pieces of Mandigo (which has good ductility and resistance to grain coarsening) and join them with the process of Werner. Brazing hot rolled or annealed aluminum is not uncommon in the heat exchanger manufacturing art.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Inquiries

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nicholas P. D'Aniello whose telephone number is (571)270-3635. The examiner can normally be reached on Monday through Thursday from 8am to 5pm (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jessica Ward can be reached on (571) 272-1223. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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/N. P. D./
Examiner, Art Unit 1793

/Jessica L. Ward/
Supervisory Patent Examiner, Art Unit 1793